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DOMINION OF CANADA

DEPARTMENT OF THE INTERIOR

Hon. Thomas G. Murphy, Minister — W. W. Cory, C.M.G., Deputy Minister

J. D. Craig, Director General of Surveys — F. H. Peters, Director, Topographical Survey

ANNUAL REPORT

OF THE

TOPOGRAPHICAL SURVEY

FOR THE

FISCAL YEAR ENDED MARCH 31, 1929

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MAPS

REPORT

OF THE

TOPOGRAPHICAL SURVEY, DEPARTMENT OF THE INTERIOR

FOR THE FISCAL YEAR ENDED MARCH 31, 1929

GENERAL STATEMENT

The Topographical Survey of the Department of the Interior is one of the major organizations of the federal government service that has at all times contributed directly and effectively to the general development of Canada. The work of the Survey was begun in the Canadian Northwest in 1869 and has been carried on from year to year in conformity with one great orderly plan of subdivision. This work consisted of two distinct operations: (1) the projection of meridian and base lines which served the dual purpose of exploratory surveys, whereby the main topographical features of the country were adequately noted and, of controlling lines from which all further surveys were made; and (2) the subdivision surveys of those areas found most suitable for settlement, which also furnished an immense amount of information for the completion of the topographic mapping of the country.

By 1926, more than 184,000,000 acres of land had been subdivided and the population of the three prairie provinces which were originally the Northwest Territories had grown to two million; whereas when the work was started the whole vast country was still given over to the fur trade, with its lonely fur posts and a few hundred canoe loads of fur as its product.

By the year 1922, the demand for land surveys became less urgent and since that year the officers of the Survey have been able to devote more of their energies towards the great work of topographically mapping the whole of Canada. With the same wide vision that characterized the organization of the Northwest survey, this enormous undertaking was planned on a Canada-wide basis, so that eventually there will be a map sheet of a uniform size, scale, and character, for every part of Canada, although no living man will see the task completed. These maps are units of what is known as the "National Topographic Series." All the map sheets will be of the same standard size but, in order to provide for the varying degrees of importance and development of the area to be mapped, a provision is made for the use of different scales.

It would be difficult to overstate the value of maps as a factor in the development of a country, especially of one that is so rich in natural resources as Canada. Ever since the first few maps of the National Topographic Series were published, the Department of the Interior has received so many requests from other departments, from provincial governments, corporations, boards of trade, etc., for the mapping of new areas that it has been found impracticable to comply with them all. Under such circumstances priority is given to the mapping of those areas which give the greatest promise of immediate development and there is always more work in prospect than can be caught up with.

One of the most important facts regarding mapping is the great assistance which it has rendered toward the growth of mining activity in Canada. There is no class of men who have shown a keener interest in and appreciation of each new map as it is published, than the prospectors and miners.

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There are few people who can visualize the immensity of Canada. It is doubtful whether one person out of every hundred who travel from Ottawa to Edmonton by express ever realizes that it is nearly as far from Edmonton to Herschel island, as it is from Ottawa to Edmonton.

With an area exceeded only by two other countries of the world, Canada still has very extensive regions which are quite inadequately mapped. Of its vast extent of 3,684,723 square miles, some 525,046 square miles or about 14 per cent has been covered by accurate topographic maps on various scales. Other maps which show considerable detail, but not completely, cover an additional 487,559 square miles, or about 13 per cent. There yet remains about 2,672,118 square miles or 73 per cent of which the present maps show only the most meagre outlines of the coast line and the main inland waterways.

In the outlying regions away from present settlement there is much bush land, with few pronounced changes in relief and filled with an intricacy of water detail that is characteristic of the great pre-Cambrian formation of Northern Canada. These regions are most difficult to map by the usual ground methods of survey, and would entail expenditure and effort far beyond the means presently available. It is in these areas that the method of oblique aerial mapping to the four-mile scale, developed by this organization to fit these very needs, has been so successfully applied. This method for the purposes required is rapid and economical and can be advantageously employed.

Where maps on a larger scale are required, or where on account of variations in the relief of the ground surface, the oblique photographic method is not applicable, vertical aerial photographs are employed in combination with methods of plotting, largely developed and improved upon in this office.

Since the year 1922, when the Survey, through the co-operation of the Royal Canadian Air Force of the Department of National Defence, began making use of aerial photographs, there have been covered in Canada some 271,000 square miles for mapping and other purposes. The aerial photographic methods have proved themselves to be admirably suited to Canadian conditions, and will be a tremendous factor in the proper and economical solution of Canada's mapping problems.

RÉSUMÉ OF OPERATIONS FOR THE YEAR

Topographical and Photo-topographical Surveys.—Surveys under this heading were executed for the purpose of preparing base maps, which are drawn to a scale conforming to the nature of the country and its economic importance. These maps, which show in detail the natural and cultural features, are necessary for proper administration, both rural and urban, and are essential for the intelligent expansion of agricultural areas and the selection of lands for parks and forestry purposes. They assist materially in the location of roads, railways and drainage systems, and in the development of mines, water-powers and forests. Showing, as they do, all routes of travel, they are practically indispensable to the tourist and the traveller.

New mapping completed, during the season, covered an area of 14,153 square miles as shown below:—

Nova Scotia (field interpretation of photographs)	1,720	square miles
New Brunswick	395	"
Quebec (including 580 square miles of the St. Lawrence river)	1,280	"
Saskatchewan	4,325	"
Alberta	5,808	"
British Columbia	625	"
	14,153	square miles

Control and Exploratory Surveys.—Surveys as a basis for topographic mapping were carried on in southwestern Nova Scotia, in the Moncton area

in New Brunswick and in a small portion of Prince Edward Island; in the St. Anne de Beaupré area; in the Upper Batiscan and St. Maurice districts; and in the district northwest of Ottawa in Quebec. The Ontario Department of Surveys conducted surveys in the district between Muskoka and lake Nipissing in co-operation with this organization. Permanent monuments to be used as reference points to which other surveys may be tied, were established in suitable locations about three miles apart, on all these surveys. The geographical co-ordinates of these monuments are computed and this information is available to the provincial authorities.

Astronomical observations for position to provide additional control necessary for mapping in the Lac la Ronge district were undertaken. Some survey work was conducted in the Wood Buffalo park in the Northwest Territories.

Explorations and investigations of an exploratory nature were carried on in the region of the west coast of Hudson bay in the Northwest Territories.

Aerial Surveys.—Aerial surveys included the work of preparing the technical instructions for all aerial photographic surveys requested by the different departments of the Dominion Government with the exception of the Geographical Section of the Department of National Defence; assisting the photographic detachments engaged on photographic operations, by providing survey officers, who act in an advisory capacity to ensure that these operations are carried out in accordance with the instructions issued, and reporting on the resulting views obtained for the guidance of the officers on similar photographic work; compiling topographic maps from both vertical and oblique aerial photographs; and indexing, recording and filing aerial photographs, and selecting and supplying copies of same as requested.

The aerial photographic surveys during the past fiscal year were for general topographical mapping and map revision, mapping of timber types, forest protection, investigation and development of the mineralized and forested areas of Northern Canada, location of transmission lines, irrigation surveys, town planning, road construction, investigation of water power development and water storage, development of tourist traffic, and for administrative, educational and illustrative purposes.

The year's work covered 65,200 square miles, exclusive of the areas covered by operations conducted for experimental or illustrative purposes only, and also of a very small strip in the Northwest Territories. The year's work was distributed as follows: —

Province	Square Miles
Nova Scotia	2,800
New Brunswick	900
Quebec	12,300
Ontario	19,500
Manitoba	5,300
Saskatchewan	14,900
Alberta	4,800
British Columbia	4,700

Legal Surveys.—These surveys included the restoration of obliterated survey monuments, township subdivision, the laying out of town and settlement lots, and the survey of water areas, timber berths, Indian reserves, National parks and forest reserves.

One party was engaged on miscellaneous surveys and Indian reserve work in the Railway Belt of British Columbia, another party on miscellaneous surveys in Alberta and Saskatchewan, and a third in Manitoba. A small road survey was also performed by contract in Yukon Territory.

Land Classification Surveys.—These surveys provide useful and reliable information which when compiled and made available will direct settlement to promising areas. Since their inception to date, such surveys have covered 31,757,880 acres, including 4,484,448 acres within forest reserves or proposed forest reserves.

During the year 503,360 acres were classified, comprising 142,240 acres in the province of Manitoba and 361,120 acres in the province of Saskatchewan.

Precise Declination Surveys.—Precise declination surveys are made for the purpose of preparing magnetic charts showing the declination of the magnetic needle. These surveys are carried on at very slight expense while the surveyors are on the ground engaged in their regular mapping and other survey work. The measurement of the declination of the magnetic needle takes but a few minutes of time, when the azimuth is available.

During the fiscal year these measurements were continued in close co-operation with other departments, provincial government services, and individuals as in the past. Over one thousand such measurements were obtained throughout the country from the Atlantic to the Pacific, the work extending into each of the nine provinces and into the Northwest Territories. The total number of such measurements made to date since the work was started in 1880 is more than twenty-four thousand.

In addition, during the year fifty-three meridian stations were established for use of provincial surveyors and others, in ascertaining compass reading for true north, for future repeat observations, and for standardizing surveying compasses.

Other Work.—In addition to the above and to the regular work of administration, the other activities of the Topographical Survey are included under the headings of Physical Testing Laboratory; Registration, Records and Distribution; Map Publication; Geographic Board of Canada; and Board of Examiners for Dominion Land Surveyors.

FIELD WORK, SURVEYS AND MAPPING

NOVA SCOTIA

Mapping Control.—Control surveys as a basis for mapping the Rossignol sheet, No. 21-A/S.W., and the St. Mary Bay sheet, No. 21-B/S.E., of the National Topographic series, were made by W. Christie, D.L.S. This control consisted of 148 miles of transit and chain traverse along the roads through the settled portions of the country, supplemented by 250 miles of stadia traverse along waterways and bush trails. On these lines 27 permanent monuments were established. In order to supply information for vertical control 82 miles of spirit levels and 144 miles of stadia levels were also run by Mr. Christie.

Topography.—The field interpretation of aerial photographs over 1,720 square miles included in the Shelburne sheet, No. 20-P/N.W. of the National Topographic series, was made by G. A. Surette, D.L.S. This sheet, which is to be published at a scale of two miles to one inch, covers an area at the extreme southwestern part of the province. It includes as an inset, Baccaro point, Cape Sable island and several smaller islands which lie slightly beyond the south boundary of the area.

Aerial Photography.—Working from the Dartmouth base, vertical aerial photographs were taken over 2,800 square miles, comprised within the following sheets of the National Topographic series:—

Shelburne, No. 20-P/N.W.
Port Mouton, No. 20-P/N.E.
Rossignol, No. 21-A/S.W.
St. Mary Bay, No. 21-B/S.E.

C. B. C. Donnelly, D.L.S., acted as aerial navigator in these operations.

Precise Declination Surveys.—On Mr. Christie's work thirty-two observations for the declination of the magnetic needle were obtained and three meridian stations established.

NEW BRUNSWICK

Mapping Control.—The control surveys required as a basis for the topographical mapping of the Moncton sheet, No. 21-I/S.E., of the National Topographic series, were completed by G. A. Bennett, D.L.S. For the New Brunswick portion of this sheet, the control consisted of 166 miles of chained traverse, supplemented by 422 miles of stadia traverse. Fifty permanent monuments were planted. A total of 162 miles of spirit levels along the chained traverse and 422 miles of stadia levels along the stadia traverse were run.

FORESTRY LOOKOUT TOWER,
RIDGE MOUNTAIN, B.C.

These lookout towers are used as observation posts by forest rangers in combating forest fires. In the view the surveyor is shown making use of it temporarily as a combined instrument station and signal point. The instrument standing upon the platform is a rangefinder mounted upon a tripod.

Topography.—An area of 395 square miles of the Moncton sheet was covered by G. A. Bennett, D.L.S., using plane-table methods. This map sheet will be issued on a scale of two miles to an inch. The greater portion is in the province of New Brunswick, but a small section of Nova Scotia and part

of Prince Edward Island, separated from the mainland by Northumberland strait, are also included. The necessary ground control for an aerial survey in connection with tidal power development on the Petitcodiac and Memramcook rivers was established. These rivers empty into Shepody bay, at the northern end of the Bay of Fundy.

Aerial Photography.—Vertical aerial photographs were taken over 900 square miles included within the Moncton sheet of the National Topographic series, and were used in connection with obtaining topographical information of the area. C. B. C. Donnelly, D.L.S., acted as aerial navigator in these operations.

Legal Surveys.—During the season the Fort Jemseg historic site was surveyed for the department by G. A. Bennett, D.L.S., acting in his capacity as a Provincial Land Surveyor for the province.

Precise Declination Surveys.—During the year fifty-seven observations for the declination of the magnetic needle were made and two meridian stations were established. With the exception of one observation taken in co-operation with this Survey by an officer of another branch of the department, these observations were made by G. A. Bennett, D.L.S., during the course of his regular mapping field work.

PRINCE EDWARD ISLAND

Mapping Control.—Control surveys required as a basis for the topographical mapping of the Moncton sheet, No. 21-I/S.E., of the National Topographic series were completed by G. A. Bennett, D.L.S. For the Prince Edward Island portion of this sheet the control consisted of 34 miles of chained traverse, supplemented by 30 miles of stadia traverse. Ten permanent monuments were planted. A total of 30 miles of spirit levels along the chained traverse and 30 miles of stadia levels along the stadia traverse were run.

Precise Declination Surveys.—While extending control surveys into that portion of Prince Edward Island covered by the Moncton sheet, G. A. Bennett, D.L.S., made fifteen observations for the declination of the magnetic needle and established four meridian stations.

QUEBEC

Mapping Control.—Three parties were employed on control surveys in Quebec. P. M. H. LeBlanc, D.L.S., ran the control surveys required for mapping the La Tuque sheet, No. 31-P/S.E., of the National Topographic series; W. A. Fletcher, D.L.S., ran the control required for mapping the Maniwaki sheet, No. 31-K/S.E.; and C. Rinfret, D.L.S., ran the control required for mapping the Beaupre sheet, No. 21-M/S.E. In all, there were run 662 miles of chained traverse control 106 miles of stadia traverse control, 529 miles of spirit levels, and 55 miles of stadia levels; and 162 permanent monuments were planted.

After the close of the regular field season, Mr. Rinfret made the necessary ground controls for constructing mosaics of Valleyfield, St. Lambert and Longueuil, and Montreal South.

Topography.—The topographical survey of the Beaupre two-mile sheet, No. 21-M./S.E., comprising an area of 1,280 square miles was completed by C. Rinfret, D.L.S., using plane-table methods. The south boundary of this sheet crosses the north end of the island of Orleans. The St. Lawrence river widens appreciably near this point; and its broad waters, flowing northeasterly, occupy almost one-third of the total area included within the sheet.

Aerial Photography.—Vertical aerial photographs were obtained over 12,300 square miles comprised within the following two-mile map sheets:—

Kempt Lake, No. 31-O/S.E.
Petawaga, No. 31-O/S.W.
Lachute, No. 31-G/N.E.
Buckingham, No. 31-G/N.W.
Parent, No. 31-O/N.E.
Abitibi, No. 32-D/N.W.

J. Carroll, D.L.S., acted as navigator in these aerial photographic operations.

Legal Surveys.—During the year C. Rinfret, D.L.S., surveyed for the department, under his commission as a Quebec Land Surveyor, two historic sites near the city of Montreal.

Precise Declination Surveys.—In the province of Quebec during the season 194 observations for the declination of the magnetic needle were taken, twenty meridian stations were established and six observations were taken with the Dover Dip Circle for the inclination of the magnetic needle and the horizontal component of the intensity of the earth's magnetic force.

With the exception of one observation for the declination of the magnetic needle taken in co-operation with this Survey by an officer of another branch of the department, this work was performed by C. Rinfret, D.L.S., W. A. Fletcher, D.L.S., P. M. H. LeBlanc, D.L.S., and B. W. Waugh, D.L.S. The six observations with the Dover Dip Circle were taken by Mr. Rinfret.

ONTARIO

Mapping Control.—The co-operation between the Ontario and Federal Survey departments, which was commented on in last year's report, was continued during the past year. Control was laid down for three map sheets on the two-mile scale, namely, the North Bay, No. 31-L/S.W., the Sundridge, No. 31-E/N.W., and the Maganatawan, No. 41-H/N.E., sheets by three Ontario Land Surveyors working under the direction of J. W. Pierce, O.L.S., D.L.S., of this Survey. A total of 734 miles of chained control traverse was run and 193 permanent monuments established. Spirit levels were run over most of the traverse lines, the total mileage of spirit levelling in this area being 608 miles.

In addition, an Ontario Government survey party working in co-operation with the Topographical Survey completed the survey and levelling of 57 miles of retracement in this area.

Two other parties were also engaged in carrying on levels in co-operation with the Ontario Government base line surveys. One party running westerly completed its work at the Manitoba-Ontario boundary; the other party working easterly reached a point about 30 miles north of Jobvin on the Canadian National Transcontinental railway. Altogether 865 miles of spirit levels were run in Ontario.

Aerial Photography.—Vertical aerial photographs were taken of the areas included in the Sundridge, No. 31-E/N.W., and Maganatawan, No. 41-H/N.E., two-mile sheets of the National Topographic series, comprising an area of about 3,000 square miles. Oblique photographs were taken from the air over the areas covered by the Dryden, No. 52-F, Ignace, No. 52-G, Rainy Lake, No. 52-C, and Deer Lake, No. 53-D, four-mile sheets of the National Topographic series, comprising a total area in Ontario of about 16,500 square miles. R. D. Davidson, D.L.S., and E. S. Fry, D.L.S., acted as aerial navigators on the oblique aerial photographic operations.

Precise Declination Surveys.—In the province of Ontario 362 magnetic declination measurements were made by Ontario Government surveyors under the direction of L. V. Rorke, Surveyor General, Ontario Department of Surveys. These were taken under a co-operative arrangement whereby the Ontario Government surveyors make these measurements on their work while the Topographical Survey looks after their compasses and makes the necessary computations, the final results being available to both governments. Co-operation was also maintained with other surveyors and organizations employing them. The total number of declination measurements in Ontario was 463, all of which were taken by surveyors other than those on the staff of the Topographical Survey. J. W. Pierce, D.L.S., on his control work in Muskoka district established ten meridian stations.

MANITOBA

Aerial Photography.—Vertical aerial photographs were obtained over the McCreary, No. 62-J/N.W., Eriksdale No. 62-J/N.E., Cormorant Lake N.W., No. 63-K/N.W. two-mile sheets of the National Topographic series and over small areas along the Churchill river. Oblique photographs were taken over the Island Lake, No. 53-E, and Deer Lake, No. 53-D, (each partly in Ontario also) four-mile sheets of the National Topographic series. The total area so photographed comprised 5,300 square miles in Manitoba and included localities where the resulting maps will be of great assistance in the protection and development of the forest resources. They will also prove of great value to prospectors in finding their way through the intricate waterways of those districts. R. D. Davidson, D.L.S., and E. S. Fry, D.L.S., acted as aerial navigators in the above operations.

Legal Surveys.—Owing to the demand for summer resort lots on Clear lake in Riding Mountain forest reserve, a further subdivision on the north side of the lake was made for the Forest Service, Department of the Interior, comprising 128 lots in nine blocks, occupying suitable locations. At the urgent request of squatters on unsurveyed lands in township 42, range 25, west of the Principal meridian, subdivision was extended over four sections to cover their improvements. Birch River settlement in township 56, range 31, west of the Principal meridian, which has been occupied by half-breed settlers since the abandonment of the former Indian reserve, was laid out into lots for the purposes of disposal. Miscellaneous surveys were made in four other townships.

The above surveys were carried out by J. Hardouin, D.L.S.

In the rural municipality of Woodworth, 125 section corners were restored with concrete monuments by A. O. Gorman, D.L.S.

Land Classification.—Certain lands in the province of Manitoba were investigated by G. J. Lonergan, D.L.S., in order to ascertain their agricultural possibilities. The investigation included part of township 42, range 25, west of the Principal meridian, and also other lands adjacent to the north and west boundary of the Sandilands forest reserve situated in the southeastern part of the province. The aggregate examination within the aforementioned lands included 142,240 acres.

In addition, certain areas producing red pine were examined, mainly in townships 1, 3 and 4, ranges 13 and 14, and townships 1 and 7, range 12, all east of the Principal meridian. This examination was undertaken to ascertain whether this species of conifer was in sufficiently great numbers to warrant their inclusion in a reserve, in order to provide the required seed for the future propagation of the species.

Precise Declination Surveys.—In Manitoba, K. F. McCusker, D.L.S., took nine observations for the declination of the magnetic needle and J. Hardouin, D.L.S., took six.

SASKATCHEWAN

Mapping Control.—Observations for astronomical position were taken in northern Saskatchewan, the observations being used to control the exploratory surveys run during the preceding year. These observations were taken both by the method of observing transits across the vertical of Polaris and across the prime vertical, and by the astrolabe method. The instrument used for the latter type of observation was a five-inch Cooke transit fitted with an astrolabe attachment. Sufficiently good results have been obtained by this method to justify the purchase of an instrument specially designed by the British Admiralty for this method of observing.

Topography.—The first field revision of the Tramping Lake sheet, No. 217, of the Sectional Map series, comprising about 4,325 square miles, was completed by G.C. Cowper, D.L.S. While this work was being carried on, approximately ten per cent of the survey monuments within the area were restored, using standard D.L.S. monuments. The great agricultural areas of Manitoba, Saskatchewan and Alberta are now almost wholly linked together by standard sheets of this type.

LATITUDE AND LONGITUDE STATION

Depicting surveyor's transit theodolite fitted with astrolabe attachment, the instrument being protected from the winds by a temporary shelter erected for the purpose.

Aerial Photography.—Oblique aerial photographic surveys were undertaken, with R. D. Davidson, D.L.S., and E. S. Fry, D.L.S., as aerial navigators, by flying boats operating from the Winnipeg Air Base or from sub-bases in that region. Oblique aerial photographs were obtained for 14,900 square miles covering parts or all of the following four-mile sheets of the National Topographic series:

Pelican Narrows, No. 63-M.
Lac la Ronge, No. 73-P.
South End, No. 64-D.

Each of these map sheets covers one degree in latitude and two degrees in longitude, and comprises an area of approximately 6,000 square miles.

Legal Surveys.—The Waterhen Lake Drainage project affected Waterhen marsh in township 44, range 21, west of the Second meridian, which was slow to drain. It having been reported to be sufficiently drained for disposal, township subdivision was completed across the former marsh and the limits of the rights of way for the drainage ditches were surveyed and monumented so that they could be reserved in the disposal of the lands affected.

A small townsite on school lands to serve a growing community was surveyed at Medstead on the Turtleford branch of the Canadian National Railways in township 50, range 15, west of the Third meridian. The subdivision was made in compliance with provincial town-planning regulations and comprised 122 business and residential lots and the usual public reserve. Miscellaneous surveys were made in ten other townships. These surveys were made by A. O. Gorman, D.L.S.

Whitefox river where it forms the northern boundary of Fort à la Corne forest reserve, comprising approximately 100 miles of river, was surveyed across township 51, ranges 18 to 22, west of the Second meridian, by K. F. McCusker, D.L.S.

Land Classification.—Ground field investigations were made by G. J. Lonergan, D.L.S., in various areas in the province of Saskatchewan within or adjacent to forest reserves or both. These were the proposed Three Rivers, the Pasquia Hills and Porcupine forest reserves and the Pasquia Triangle. The latter territory lies adjacent to the Pasquia Hills forest reserve, and is of a triangular figure, its apex being at Hudson Bay Junction. It is bounded on the side to the northwest by part of the Canadian National Railways line to Hudson bay, on the east side, or the base, by the interprovincial boundary line between the provinces of Manitoba and Saskatchewan, and on the third or south side by part of the Canadian National Railways line from Winnipeg to Hudson Bay Junction.

The investigated acreage within reserves and proposed reserves is equivalent to 199,680 acres and the adjacent lands include 161,440 acres, making a total of 361,120 acres examined within the province.

Precise Declination Surveys.—In the province of Saskatchewan, a total of twenty-six observations for the declination of the magnetic needle were taken by Messrs. A. O. Gorman, D.L.S., C. S. Macdonald, D.L.S., G. C. Cowper, D.L.S., and J. Hardouin, D.L.S. Mr. Macdonald also established five meridian stations.

ALBERTA

Topography.—The first field revision of the Fort Assiniboine sheet, No. 364, of the Sectional Map series, was completed by G. J. Lonergan, D.L.S.

Two one-mile sheets of the National Topographic series near Calgary were completed by E. Bartlett, D.L.S., under the general supervision of M. P. Bridgland, D.L.S. The topography for 118 square miles on the Calgary Southeast sheet, No 82-I/13, and 300 square miles on the Calgary Southwest sheet, No. 82-J/16, was obtained by plane-table methods, using also vertical aerial photographs which had previously been taken over a portion of the area. These sheets will be issued on the scale of one mile to an inch with a contour interval of twenty-five feet.

Photo-topography.—An area of 500 square miles within Jasper national park was mapped by M. P. Bridgland, D.L.S., using photo-topographical methods, and an area of 170 square miles along the northerly boundary of the park was similarly mapped by H. F. Lambart, D.L.S.

Aerial Photography.—Oblique aerial photographs were taken over 4,800 square miles, comprised within the Fitzgerald, No. 74-M, four-mile sheet of the National Topographic series. J. Russell, D.L.S., acted as aerial navigator for these operations.

Legal Surveys.—In order to furnish information for municipal purposes, the marginal lands around Wavy lake in townships 44 and 45-15-4 were investigated by A. O. Gorman, D.L.S. This lake had been set aside as a public shooting ground, including a portion of the marginal lands, and the department required an investigation in order to decide what disposal of the area was most suitable. Mr. Gorman also made miscellaneous surveys in five other townships.

The southern boundary of Timber Berth No. 618-E near Banff in Rocky Mountains park was established by K. F. McCusker, D.L.S. He also investigated the claims of squatters on valuable school lands near Drumheller, to aid in a decision as to the final disposal of the land. Several trails were located in Wood Buffalo park by J. Russell, D.L.S.

Precise Declination Surveys.—In the province of Alberta 47 observations for the declination of the magnetic needle were taken by Messrs. M. P. Bridgland, D.L.S., R. W. Cautley, D.L.S., K. F. McCusker, D.L.S., and A. O. Gorman, D.L.S. The last mentioned surveyor also established two meridian stations.

BRITISH COLUMBIA

Aerial Photography.—Vertical aerial photography was carried out over the major portions of the Shuswap Lake sheet, No. 82-L/N.W., Fraser Lake sheet, No. 93-K/S.E., and Burns Lake sheet, No. 93-K/S.W., of the National Topographic series, the total area photographed being 4,700 square miles. C. H. Taggart, D.L.S., acted as aerial navigator for this work.

Photo-topography.—The remainder of the Merritt two-mile sheet, No. 92-I/S.E., of the National Topographic series, comprising an area of 275 square miles was completed by C. H. Taggart, D.L.S. The work was then proceeded with on the sheet lying immediately to the northeast, namely, Shuswap Lake sheet, No. 82-L/N.W. This latter area has lately come into prominence owing to the discovery of silver-lead ore on the Adams plateau, the projected power development on Adams river, and the extensive timber stands to the north of Shuswap lake.

On the Shuswap Lake sheet 50 square miles were plotted by means of the range-finder and 100 square miles from aerial photographs. Despite the rugged nature of the country, aerial photographs were taken over approximately 2,000 square miles without difficulty; but the continuance of this type of survey, which was purely experimental, is necessarily contingent on the cost of plotting and the accuracy of the final results.

Forestry monuments were established, and magnetic observations taken in pursuance of the general plan laid down for country-wide magnetic control.

The remainder of the Revelstoke two-mile sheet, No. 82-L/N.E., of the National Topographic series, comprising an area of 300 square miles, was completed by L. E. Harris, D.L.S., working under the general supervision of M. P. Bridgland, D.L.S. This work was done for forestry purposes and photo-topographical methods were used.

Legal Surveys.—The field work in this province consisted, as it did in 1926 and 1927, of miscellaneous surveys of a varied character made for our own department and of the survey of Indian reserves made for the Department of Indian Affairs. The one party regularly employed during the season spent approximately one-third of the time on miscellaneous surveys and the other two-thirds on the Indian Reserve work. The season's work was arranged, so far as possible, with due regard to the varied climatic conditions which obtained throughout the Railway Belt.

In addition to the miscellaneous surveys such as are regularly made in order to deal with Dominion Lands, instructions were issued for the surveys necessary for an irrigation scheme in the Kamloops district and for the delimita-

tion of a portion of the western boundary of the Railway Belt. In the latter case a portion of the Belt boundary also formed a part of the limits of Vancouver harbour and the question which was referred to this office by the Department of Marine and Fisheries involved the concurrence of both the provincial Government and the Vancouver Harbour Board.

The miscellaneous surveys undertaken by the seasonal party included the survey of two timber berths in the Coast district, one restoration survey in the eastern part of the Belt and one in the western part, together with a subdivision survey and a stadia traverse in two separate townships in the Coast district.

AIR BASE AT REINDEER RIVER, SOUTH END OF REINDEER LAKE.

In establishing a temporary air base for photographic operations in our northern areas, the location is first selected and gasoline, the heaviest item, is usually freighted in during the winter by horse team or dogs, though it may be brought in by canoe in summer. Camp is pitched and other necessary supplies flown in.

In this particular picture, the harbour is ideal and has been used at various times since the year 1924. It is situated in Reindeer river, the outlet of Reindeer lake in northern Saskatchewan and is very well sheltered, at the same time affording easy access to the open waters of the lake. The water is clear and deep to the very shore line which is a cobble stone beach, thus permitting the machines to be safely beached and eliminating the use of buoys.

The flying boats in the view are three Vickers Vedettes, used for the actual photography and one Viking used for freighting and keeping up communications with the nearest railhead.

Sixteen Indian reserves were surveyed altogether, and of these, five were new reserves and eleven were old reserves. In the survey of new reserves the boundaries were perpetuated with standard survey posts while the old reserve boundaries were retraced and re-established where necessary, the old wooden posts being replaced with standard posts where found. In both cases proper ties were made to the Dominion Lands system of survey in order that a proper basis of description for the transfer of the lands involved could be furnished.

Precise Declination Surveys.—A total of 74 observations for the declination of the magnetic needle were taken during the year by Messrs. J. A. Calder, D.L.S., and C. H. Taggart, D.L.S. In addition, Mr. Calder established one meridian station and Mr. Taggart six meridian stations.

YUKON TERRITORY

Legal Surveys.—The delimitation of 40 miles of road from Mayo to Dawson was completed. This work was performed by H. G. Dickson, D.L.S., under contract, Mr. Dickson not being a member of the staff.

NORTHWEST TERRITORIES

Exploratory Surveys.—Explorations and investigations of an exploratory nature were carried on in the Northwest Territories on the west coast of Hudson bay by G. H. Blanchet, D.L.S., who accompanied a reconnaissance expedition sent out by a private company to investigate this region for mineral possibilities. The party reached the location of the scene of their operations by steamer from Halifax and during the course of the explorations made extensive use of aeroplanes. In general, the country investigated lay between Ferguson river and Marble island and extended westerly to Kaminuriak lake.

Aerial Surveys.—In the operations of J. Russell, D.L.S., who acted as aerial navigator on the taking of oblique aerial photographs over the Fitzgerald, No. 74-M, four-mile sheet of the National Topographic series, a small area was flown north of the sheet in the Northwest Territories.

Precise Declination Surveys.—K. F. McCusker, D.L.S., took one observation for the magnetic declination in the Northwest Territories in the vicinity of Fort Smith. Through the co-operation of the North West Territories and Yukon Branch of the Department of the Interior, J. D. Soper, who was sent north to make researches in Baffin island, took 85 observations for the declination of the magnetic neede on his travels during the year.

Magnetic observations were made by G. H. Blanchet, D.L.S., on his explorations and investigations along the west coast of Hudson bay. Through the co-operation of the North West Territories and Yukon branch of the Department, Major L. T. Burwash, who was sent north to make researches around the north magnetic pole on Boothia peninsula on the Arctic coast of Canada also took precise declination observations for determining the present position of the north magnetic pole.

OFFICE WORK, SURVEYS AND MAPPING

TOPOGRAPHICAL AND PHOTO-TOPOGRAPHICAL SURVEYS

Instructions were issued to the field staff for the surveys of 1928; and all available information relevant to the work was collected from office records and other sources and supplied in convenient form for field use.

Numerous standard topographic maps, which have been devised to suit the peculiar requirements of the areas they cover, were compiled. This work involves the preparation of specifications, the plotting of topography, and the checking of the final proofs.

Projections were prepared as required for the use of the Aerial Division. This work entails the plotting of ground surveys over areas that have been photographed from the air; and is necessary for the proper control of the topography. In all, twenty-eight sheets of the National Topographic series, to be issued on the scale of four miles to one inch, were treated in this way.

In addition to the usual standard maps, a number of special maps were undertaken for particular purposes; also numerous key, magnetic, and dummy maps were prepared. All names appearing on maps, plans and reports were carefully checked as to duplication and suitability, and new names suggested when required. The final adoption of any name was left to the Geographic

Board. Spirit and stadia levels, which are run for the control of topographic mapping, were examined and filed by the Topographical Surveys Division.

A list of the maps worked on and brought to various stages of completion during the year includes sheets of the National Topographic series as follows: 8 on the one-mile scale, 25 on the two-mile scale, 32 on the four-mile scale, 1 on the eight-mile scale, and also 11 sheets of the Sectional Map series on the three-mile scale, and 11 miscellaneous maps.

CONTROL SURVEYS

Control surveys are those which furnish the frame work for all topographic surveys and for the maps which are compiled from such surveys. In Canada, all control surveys are primarily based on points established with the utmost accuracy by the Geodetic Survey of Canada, but such points are necessarily few and far between so that it is requisite to provide a considerable amount of secondary control in any district which it is proposed to map.

There are four principal methods in use for providing control surveys, namely, triangulation, chained traverses, stadia traverses, and the establishment of astronomical stations.

Triangulation is a method which ensures great accuracy and is most applicable to parts of the country in which there is considerable variation of vertical relief. In high mountainous areas, for instance, it is the only practicable method of obtaining survey control.

Chained traverses along railways, roads or waterways provide a system of control which is extremely useful for mapping purposes, because it not only establishes the necessary control but also provides accurate topographical information in regard to many of the main features of the country. Chained traverses give results in direct proportion to the precision and accuracy with which they are made. For the purpose of providing control for the National Topographic series of maps, which is designed to eventually cover the whole of Canada, it is laid down in the Manual for Control Surveys that the error of a chained traverse shall not exceed 1 in 5,000.

Stadia traverses differ from chained traverses in that the lengths of the various courses are measured by stadia methods instead of being chained. They have been successfully used for carrying on exploratory surveys from which it is proposed to make provisional maps. They are also useful as a means of filling in between lines of superior control and thus affording secondary control on which plane-tabling and other topographic surveying may be based.

Astronomic control consists in the determination of the geographical positions of some readily identifiable points of the district by astronomic observations of trained astronomers made with instruments of great precision. Its merits consist in the facts that (*a*) it is the least expensive method; (*b*) that it is not subject to cumulative error, and (*c*) that it can be applied to very inaccessible parts of the country without involving any chain of connecting survey. This method is particularly suited to providing control for aerial photographic surveys of unexplored country where transportation is difficult and expensive and where the discrepancies between astronomic and geographic data are not of great importance.

The control surveys carried on by the Topographical Survey, while primarily for the purpose of providing a basis for the maps of the National Topographic series, have an added value due to the monuments planted to perpetuate the survey. These monuments, which are of a very permanent nature, are placed at frequent intervals along the roads and railways and provide provincial and private surveyors and engineers with a large number of easily accessible and conveniently located points whose positions are accurately known. This system of points provides the surveyor or engineer with a datum of unquestioned accuracy from which he can start and to which he can tie and co-ordinate his sur-

veys, thereby lessening the cost of his local surveys; it is valuable also to the provincial and federal governments in that each detailed survey made by a private company for a specific purpose may be co-ordinated into the general scheme of survey and, if of a satisfactory degree of precision, into the maps of the National Topographic series. Several of the provincial governments have further recognized the value of the system of monuments of this Survey and have accepted them as official monuments.

CONTROL MONUMENTS FOR TOPOGRAPHIC MAPPING

The view shows a surveyor standing over a monument placed to perpetuate a point on control surveys in Prince Edward Island. This consists of a bronze cap on a short bronze stud cemented into a hole drilled into a large granite boulder. The geographical position and the elevation of the post are accurately known, from connection with geodetic triangulation points by means of chained, transited and levelled traverse lines. It will serve in the future as a convenient point to which to tie in later surveys in this vicinity.

The control surveys as carried on in the field are given under the section "Field Work, Surveys and Mapping." The exploratory surveys and investigations in the Northwest Territories are also noted in that section.

The office work connected with these surveys includes: the reduction of the field notes; the computation of all astronomical observations for azimuth, latitude and longitude; the computation and tabulation of the geographical positions of the permanent monuments planted during the season; the plotting of the various surveys on the proper projection sheets, and collaboration with the Aerial Surveys Division in the preparation of the resulting topographical map sheets; the preparation of the final field returns for permanent record; and other related work that may arise.

AERIAL SURVEYS

The office work under Aerial Surveys included the preparing of the technical instructions for all aerial photographic surveys requested by the different departments of the Dominion Government with the exception of the Geographical Section of the Department of National Defence; assisting the photographic detachments engaged on photographic operations by providing survey officers who acted in an advisory capacity to ensure that these operations were carried out in accordance with the instructions issued, and reporting on the resulting

views obtained for the guidance of the officers on similar photographic work; compiling topographic maps from both vertical and oblique aerial photographs; indexing, recording and filing aerial photographs, and selecting and supplying copies of same as requested.

The aerial photographic surveys during the past fiscal year were for general topographic mapping and map revision, mapping of timber types, forest protection, investigation and development of the mineralized and forested areas of Northern Canada, location of transmission lines and reconnaissance for railway location, irrigation surveys, town planning, road construction, investigation of water power development and water storage, development of tourist traffic and for administrative, educational and illustrative purposes.

The graphical method at present in use for transferring the detail from the oblique aerial photographs to the map plot was originated in this office and is undoubtedly the most rapid and economical method at present available for the type of country covered and the scale used. Further research, however, will probably result in further improvement, possibly by the introduction of time-saving features which are automatic or semi-automatic in their operation.

The extensive prospecting activity taking place in the vicinity of many areas where oblique aerial photography is being carried out, is creating an urgent demand for the immediate preparation of the map sheets to serve in the development of the areas.

Of the areas over which oblique aerial photographs were obtained during the 1928 season and previously, eleven four-mile map sheets of the National Topographic series are now being compiled.

Six four-mile map sheets of the National Topographic series were compiled and published during the year from oblique aerial photographs obtained previous to 1928.

A large program of vertical aerial photography was also carried out during the year for various purposes, such as making topographic maps of areas photographed, constructing mosaics of important areas, investigating prospective power developments, water storage, reservoirs and other engineering problems. The most extensive use was in connection with the preparation for issue of map sheets of the National Topographic series, on the scale of two miles to an inch. Each of these sheets covers one degree in longitude and one-half degree in latitude, and comprises an area of approximately 1,500 square miles.

Mapping from the vertical aerial photographs is done by the radial intersection method. The procedure is to plot each strip to the average scale of the photographs contained therein on the assumption that each photograph is "angle true" at the principal point. The strip plot in whole or in part is then reduced, as determined by ground control traverses intersecting the flight to the scale of one-half mile to an inch. At this scale the strip reductions are compiled, and the compilation is subsequently rephotographed to be printed on the two-mile scale.

Thirteen map sheets of the National Topographic series, on the two-mile scale, are now being compiled from vertical aerial photographs obtained during 1928 and previously, and mosaics have been constructed of the following:—

Saskatoon, Sask.,
Baie des Ha Ha, P.Q.
Ste. Anne de la Pocatière, P.Q.
Merivale, Ont.,
Valleyfield, P.Q.,
Rockcliffe Aerodrome, Ont. (three different mosaics),
St. Hubert Air Station, P.Q.
Sudbury-Copper Cliff, Ont.
Kingsmere Lake, P.Q.

STEREOSCOPY AND AERIAL MAPPING

Overlapping portions of two adjacent vertical aerial photographs arranged for stereoscopic examination. The photographs themselves were taken from an altitude of 10,000 feet with an aerial camera equipped with an 8-inch lens, the above portions of them being shown full size. Stereoscopic examination brings out the natural relief of the ground features, thus providing a most valuable aid toward their identification when the photographs are being used for mapping purposes. Views are taken at Loch Lomond near French Village in New Brunswick.

Royal Ottawa Golf Club, Ottawa.
Simon Lake Area, P.Q.
Montreal South, Longueuil, St. Lambert, P.Q.
Echo Lake, P.Q.

Besides the mapping of the regular sheets of the National Topographic series, special maps showing timbered areas were also prepared for the use of the Forest Service, Department of the Interior. These were of the areas covered by four-mile map sheets, Grand Rapids, Cormorant Lake, Wekusko Lake, and portions of The Pas and Cross Lake. Copies of these on the one-half mile and two-mile scales were supplied the Forest Service, and proved to be of great assistance to them in their examination of these areas. Special mapping was also done in the Gatineau river and Lièvre river areas for the James MacLaren Company, and the Canadian International Paper Company. Special copies on a scale of one mile to an inch, were supplied these companies, of the two-mile map sheets of the National Topographic series, Petawaga, No. 31-O/S.W., and Kempt Lake, No. 31-O/S.E. An area of 2,200 square miles in the vicinity of lac Seul was vertically photographed and prints of the negatives obtained were used in the field by the officials of the Ontario and Dominion Governments engaged in the examination and determination of the areas to be flooded by raising the water level of this lake for storage purposes. The location of the contour line marking the proposed high-water level was indicated on the prints in the field, and this information was shown on the maps—scale one-half mile to an inch—compiled from the photographs covering Lac Seul storage area.

During the fiscal year detailed instructions to accompany sixty-seven operation orders were written and guide maps were prepared to show the projected lines of flight.

An approximate area of 65,200 square miles was covered by aerial surveys, 52 per cent, or 33,800 square miles by oblique, and 48 per cent, or 31,400 square miles by vertical aerial surveys.

In all, 92,185 aerial photographs were obtained from the different air bases as follows:—

Vancouver, B.C.	12,260
Winnipeg, Man.	30,550
Ottawa, Ont.	39,860
Dartmouth, N.S.	5,500
Fairchild Aviation Limited, Grand Mère, P.Q.	4,015

Besides the above, 90,500 additional prints were received for various uses, such as for transmission to other federal services, for constructing mosaics, for surveyors' use in the field, and for distribution on a repayment basis to provincial government officials, city engineers, mining and lumbering corporations, municipalities, etc.

LEGAL SURVEYS

The correspondence relating to legal surveys has increased in volume and complexity during the year. Many inquiries from provincial and municipal officers, lawyers, surveyors and business firms have been received for information about early surveys, land and water areas, disputed boundaries, reported errors in survey and other matters relating to the Dominion lands system of survey in the western provinces. The inquiries ranged from simple requests for information to knotty problems concerning the legality of surveys and of procedure, and the interpretation of regulations and of titles. Long and careful research and expert attention were required in the preparation of the replies. In all about 1,000 communications were dealt with, about 200 sketches prepared, and about 2,000 areas computed and furnished.

Mineral Claim and Other Surveys.—Though mineral claims on Dominion lands are surveyed by private surveyors, the surveys have to be made under instructions from the Surveyor General and have subsequently to be approved by him. The success of the Flin Flon, Sherritt-Gordon and Manitoba Basin mines has stimulated activity in mining and increased the number of surveys. Instructions for the survey of 518 claims were issued and the returns of survey of 504 claims were examined, many of the latter being in triplicate.

In addition to mineral claims the surveys in the Yukon territory comprised a few surface lots and the delimitation of 40 miles of the road from Mayo to Dawson.

Plans of survey of new roads in the western provinces to the number of 334 were submitted to the Surveyor General for examination and acceptance as required by statute in order to acquire title to the right of way.

In the matter of railway rights of way 108 plans of survey were examined for approval by the Surveyor General prior to being used for departmental purposes and 25 other miscellaneous plans were examined as to their correctness and sufficiency for departmental use.

Detailed information of all the survey monuments in 60 townships was furnished to officers of the Manitoba Government.

In addition to the foregoing, 94 township plans and 25 miscellaneous plans were prepared for the draughtsmen and 124 draughted plans were compared with the compiled plans and passed for approval.

In connection with the foregoing 7,000 recorded field books and plans were consulted.

LAND CLASSIFICATION SURVEYS

The office activities of the staff during the year comprised the examination, checking and co-ordinating of the field returns, the compilation of plans, and in certain cases maps illustrative of the field results for the respective investigated areas, and the preparation of the various reports relating thereto.

The plans are assembled in folio form and, together with the typewritten bound reports, are supplied to Dominion Land agencies and sub-agencies for the district, additional copies being supplied to other Dominion and provincial agencies, and the colonization and development departments of the Canadian National and Canadian Pacific Railway Companies.

The 1924 edition of the map of the Peace River Block, province of British Columbia, compiled from land classification surveys being nearly out of print, and in order to meet the demands of the public for this map it was duly revised, reprinted and released.

PRECISE DECLINATION SURVEYS

The needle of the magnetic compass does not point north but more or less to the east or west at different places. Therefore, the different countries of the world measure the true direction of the compass needle, or the magnetic "declination" or "variation" as it is called, and show it on declination charts in order that the compass may be used with reliance.

Such information is particularly valuable in such a large new country as Canada for the use of surveyors, airmen, navigators, explorers, miners, prospectors, timber-cruisers, settlers, hunters, etc. For the purpose of supplying this information, precise declination measurements, in close co-operation with the provinces, were conducted by the survey parties during 1928. As in the past, this work entailed very little expense, being carried on in conjunction with the regular surveys and making use of the astronomical bearings available from them. Some 1,000 precise declination observations were thus obtained throughout the country from the Atlantic to the Pacific and from the

International Boundary almost to the Arctic circle, making the total number of observations obtained throughout the country since this work was started in 1880 over 24,000.

Many observations were obtained in new areas, particularly in Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario and British Columbia.

The work was carried on in close co-operation with the Meteorological Service of Canada, the Dominion Observatory, the Ontario Department of Surveys, and various provincial governments and surveyors in order to utilize fully the results of all work done.

In order to make the precise declination results available to the public in the most convenient form for ready reference, the custom prevailing in other countries of publishing declination maps has been followed here. The latest declination map of Canada is entitled "Lines of Equal Magnetic Declination and Annual Change in Canada for 1927" and was compiled from all data available from all sources. During 1928, it was supplemented by the compilation of twenty-three small declination maps for publication on the sheets of the Sectional Map series, National Topographic series, etc., to supply up-to-date practical compass information to those using the maps. Similar information was supplied to the Canadian Hydrographic Service of the Department of Marine and Fisheries for their charts.

The problem of the compass needle is further complicated by the fact that it changes its direction from year to year, and thus the work already accomplished would soon become obsolete if proper precautions were not taken to keep it up to date. Moreover, when it is required to re-survey and re-establish an old lost boundary line run by compass many years ago, it is essential to know beforehand the change in the compass needle direction since the old survey was made.

This change in the compass needle direction from year to year is tabulated in Bulletin 58 "The March of the Compass in Canada." During the past year, this information was supplemented and extended by making repeat declination observations at important points in close co-operation with the provinces.

Recent researches indicate that the yearly change in direction is due to the action of magnetic forces within the earth. It has been felt that additional magnetic data in the Far North, especially in regard to the march of the north magnetic pole, would afford additional information on this question. During 1928, the North West Territories and Yukon Branch were sending Major L. T. Burwash to the vicinity of the north magnetic pole for a year's stay among the Eskimos to conduct important Arctic researches; and O. S. Finnie, the Director, very kindly advised that Major Burwash, who had previously made measurements of the magnetic needle direction in the Far North for this Survey, was ready to make investigations in regard to the present position of the north magnetic pole. This proposal was gratefully accepted and the necessary instruments and instructions were supplied; and the results are expected to throw further light on this difficult subject. It is to be hoped, that due to modern improvements in transportation and communication, much more data may be obtained in the near future in regard to the march of the magnetic poles; and it is confidently expected that a satisfactory solution of this problem will help very materially in solving the very practical problem of why the compass needle should change its direction from year to year.

In co-operation with several of the provinces, many magnetic meridian stations were established in conjunction with repeat stations and permanently marked for the convenience of provincial surveyors in standardizing the compasses of their transits.

The magnetic intensity and the dip or inclination, which are very important in explaining the behaviour of the compass needle, were (as noted previously) determined at six stations in the province of Quebec.

As in the past, all magnetic instruments used, were standardized at the beginning and at the end of the season at the Magnetic Observatory, Agincourt, Ont., through the courtesy of Sir Frederic Stupart, Director of the Meteorological Service of Canada.

Correspondence was carried on with many scientific and government authorities, commercial firms, and the general public, and declination maps supplied to those using the compass. The magnetic stations were plotted on the map sheets of the National Topographic series and the Sectional Map series, and the other general office work of computing, reducing and preparing returns for publication, including corrections for daily and yearly changes, determining index corrections for surveyors' transits, demonstrating methods of observing, issuing instructions for field parties, etc., were carried out as in the past. Researches were made in diurnal inequality and secular change with the object of still further improving the work and handling it even more expeditiously and economically; and several short articles describing the work were written for various purposes.

Of recent years considerable attention has been directed towards geophysical prospecting for oil or metals by means of electrical, magnetic, gravitational, seismographic and radio measurements, etc., in order to avoid the expense of test pits, test wells and diamond drilling. The large number of magnetic measurements made by this Survey may be used as a basis for magnetometric prospecting in some areas.

As the very large amount of data shows, this Survey has for years co-operated towards obtaining a wide knowledge of the magnetized state of the earth and its various confusing changes. This information is useful not only to compass users but will undoubtedly aid very materially in working out problems of practical value connected with terrestrial magnetism.

PHYSICAL TESTING LABORATORY

The growth in the work of the Physical Testing Laboratory mentioned in previous reports has continued.

Among visitors to the laboratory may be mentioned Mr. E. L. Sayce, of the Federal Government Service, Australia, who was making an extended tour of the principal metrological laboratories of the world, with a view to the development of such a laboratory in Australia.

General Instruments.—This section has again been fully occupied. In past years the work was more or less of a seasonal nature, the bulk being done in the spring, leaving the staff free to conduct special investigations or assist in other sections during the summer. Now, however, there is very little time available for other than routine work throughout the year and it is difficult to cope with the rush of work in the spring.

One noticeable feature of the past year is the number of aerial surveying cameras sent for calibration and test by commercial interests.

Metrology.—A bulletin, No. 60, " A study of the Dominion Standard Yard and other Standards of Length ", was published and gives a full description of the tests to which reference was made in the past two years.

Some years ago the Bureau of Standards at Washington verified the length of a one-metre invar rule for the Physical Testing Laboratory, but the results obtained at different temperatures were not concordant. The bureau suggested that this might be due to an error in the assumed values of the dilatation coefficients. The coefficients, however, were determined at the Physical Testing

Laboratory and found to agree with those originally given by the International Bureau of Weights and Measures, which standardized the rule in question before it was sent to Canada. Other cases are known where discordancies have been found in the comparisons of standard rules.

As a new and more modern comparator had now been installed at Washington it was felt by the Bureau of Standards, that the time was opportune to carry out some tests to see if agreement could be reached between observations made on standard rules at Ottawa and Washington. At the same time it was hoped that these tests might throw light on the whole subject of rule comparisons.

Two metre-rules were carried from Washington to Ottawa, and compared in a closed series, i.e., in every possible combination of two rules, with two of the Physical Testing Laboratory rules. Then the four rules were taken to Washington and the same program repeated there. In addition, all four rules were compared directly with metre prototype No. 27, the official legal standard for both the yard and the metre in the United States.

While the immense mass of data resulting from the tests is now only being digested, one or two interesting points have come to light.

The comparator at Washington used in these tests is of a new type in which the microscope beam, instead of being stationary as in most comparators, is moved longitudinally over the rules which are placed end to end in the tank. The comparator at Ottawa is of the orthodox type, so there was a decided difference in the apparatus used. However, no very large systematic difference was found in the results of the comparisons made with different observers and with both comparators. It would appear that high magnification for the microscopes, of the order of one hundred or more diameters, as used at both Ottawa and Washington, is an important factor in contributing to this result.

Comparisons made with the metre prototype No. 27 indicated that both the Physical Testing Laboratory rules had changed in one direction since being last verified at Sevres in 1924. This was an unexpected result, particularly as a test of the one-yard intervals of these rules by the National Physical Laboratory in 1928 confirmed the length obtained for this interval in 1924. Further investigations are planned with regard to this discrepancy.

When the documents relating to the various rules were being examined it was found that while the Canadian Weights and Measures Act stated that specified, restricted, portions of the defining lines of the Canadian Standard Yard are to be used during the observations, no parallel statement appears in the definition of the International Standard metre or in the certificates of the prototypes. This is of great importance as it is the usual custom, when observing the prototypes, to use all the portion of each defining line bounded by two longitudinal lines instead of the restricted central portion mentioned in the legal definition of the Canadian Yard.

As this matter is an important one, where all ambiguities must be removed, it is proposed that Canada forward a resolution to the International Committee of Weights and Measures to the effect that, (1) the definition of the International Metre Standard be amended to include a statement regarding the exact way the defining lines are used, and (2) that a similar statement be included in all certificates issued by the International Bureau of Weights and Measures.

This section tested 275 hydrometers during the year for the Department of National Revenue as well as 180 invar tapes and steel tapes.

Sixteen new thermometers of French make were purchased to replace the Tonnelot " verre dur " thermometers used in the metrological work.

Thermometry.—In connection with the research on length standards, two of the Physical Testing Laboratory thermometers were taken to the Bureau of Standards with the rules so that the scale of temperature used in both the institutions concerned could be compared. With the exception of the ice point, where

a systematic difference of between one and two one-hundredths of a degree occurred, the agreement was good. It was found that the difference was due to the bureau heating the thermometer to the highest reading before taking the ice-point whereas the Laboratory took this point after exposure to room temperature. On a subsequent occasion one of the technical staff of the bureau brought to Ottawa some thermometers, of which the ice-points had been carefully determined, and complete accord was found between the tests at Ottawa and Washington.

Barometers and Aeronautical Instruments.—The refrigerator is now being installed and should be in regular use shortly. The need for this equipment is more important than ever with the growth of winter aviation in Canada.One company carried on some photographic surveying this year in mid-winter, and was particularly anxious for the altimeters employed to be calibrated under the conditions met with in practice.

This section tested two altimeters of a very recent type developed by the British Air Ministry. These instruments are original in several points of design, notably in having the main spring constrained solely by knife-edges and in the provision of a bimetallic helix on the hand arbour to produce temperature compensation.

A number of new surveying aneroids, specially made by a well known British firm to comply with the specifications of the Laboratory, were tested before being put into service. These instruments show a marked improvement over any received before in a commercial way and really embody the results of the work of the Laboratory in endeavouring to obtain more reliable surveying aneroids.

Instrument Shop.—More demands than could possibly be satisfied were made on the shop during the year and unavoidable delays occurred in getting out work. Novel instruments constructed for experimental purposes comprised a clinometer for mounting on a rangefinder, so that the use of a transit in conjunction with the rangefinder could be dispensed with, and a new type of surveying camera, lighter and yet stronger than the former pattern in use. A number of additions and modifications were made to instruments to be used for special purposes.

REGISTRATION, RECORDS AND DISTRIBUTION

The work of the Registration, Records and Distribution Division consists, in general, of the registration and recording of all the various returns of surveys received from the surveyors in the field and of the plans of rights of way, roads, mineral claims, Indian reserves, etc.; furnishing copies of field notes and traverse plots as required; dealing with technical correspondence relating to the surveyors' field notes, the storing and distributing of the official plans of townships, townsites, settlements, etc.; the distribution of the various maps and publications issued by the branch, and other related work.

The following survey returns were received for examination from surveyors in the field, railway companies and provincial governments, and were entered in the various registers, plotted on the various index maps, etc.: 474 books of field notes, 958 plans, and 1,006 miscellaneous returns consisting of stadia plots, plane-table sheets, various reports, etc.

On the completion of the examination, the field books and various original plans are placed on record. There is also recorded the signed copy of each official plan issued by the branch. During the year, 505 new field books and 835 new plans were placed on official record. The total number on record is now 20,474 books and 36,462 plans.

The work of dealing with requests for technical information relating to surveys and survey records was carried on as usual. These requests are received from various branches of the federal and provincial governments, surveyors and engineers, law firms, and from the general public, and relate to survey monuments, conflicting boundaries, etc. This involves not only the searching of the surveyors' field notes and files but in many cases the supplying of copies of the notes and the preparation of survey sketches. When required for the law courts, the copies of the notes and plans are officially certified to. Three hundred and ninety-five such requests were dealt with.

The number of copies of plans of townships, settlements and townsites which were received and stored was 8,483. The number of copies distributed during the same period was 8,998.

The various maps, reports, technical pamphlets, etc., were distributed throughout the year as usual. During the twelve months there were distributed 42,331 maps and 5,722 publications. The numbers distributed exceed those for last year by 8,680 maps and 2,451 publications. In the distribution of these 12,015 requests were dealt with, 2,884 more than for the year before.

The most important maps issued during the twelve months are as follows: Sorel, Calgary Northeast, Wolfville, Shawinigan, Comeau Hill and Fredericton maps of the National Topographic series, on a scale of one mile to an inch; the Kamloops Lake map of the same series on a scale of two miles to an inch; the Kississing, Sioux Lookout, Prophet River, Halfway River, Berens River, Armstrong, Norway House, Lake St. Joseph and Kenora maps (provisional editions) of the above series, on a scale of four miles to an inch; an index of the above series for Saskatchewan, Manitoba and Northwestern Ontario; the Vermilion sectional map, No. 316, and the Battleford sectional map, No. 267, both issued for the first time in the new series, scale three miles to an inch; a new edition of the Edmonton new series sectional map, No. 315, scale three miles to an inch; reprints of the Winnipeg, Lethbridge, Red Deer, Brandon and Rosebud, new series sectional maps, scale three miles to an inch; the Dunvegan sectional map intermediate series, scale three miles to an inch; reprints of the Yale, Prince Albert South, Seymour, Brazeau, McMurray, Athabaska, Porcupine, Smoky River, Giroux, Swan River, Brulé, Duck Mountain and Sicamous old series sectional maps, scale three miles to an inch; the Saskatoon, Edmonton, Battleford and Vermilion sectional maps on a scale of six miles, issued for the first time in the new series on this scale; the Regina sheet, No. N.M. 13 of the International map of the world, scale 1:1,000,000; sheets 41 and 42 of the British Columbia-Alberta boundary; new edition of the land classification map of the Peace River Block; new editions of the Lockhart River Basin, Lake Athabaska, Fort Smith to Resolution; exploratory maps and reprints of the map of The Pas Mineral Area and Reindeer Lake.

The following publications were issued during the year: Annual Report of the Topographical Survey for the year ending March 31, 1927; Report on an Exploratory trip in the area covered by the Halfway River and Prophet River sheets of the National Topographic series in British Columbia; Report of the Commission appointed to delimit the Boundary between Alberta and British Columbia, part 3; a study of the Dominion Standard Yard and other Standards of Length.

MAP PUBLICATION

The Map Publication Division includes the drafting rooms, the photographic and lithographic offices, and the relief map room. This division cooperates with the compilers in the preparation of copy, makes a drawing of it suitable for reproduction, photographs it to zinc or stone, and prints an edition.

In addition to the principal work of compiling, drafting, photographing and printing editions of maps and plans, there is done related work such as gen-

MOSAIC MAPPING

The original mosaic map of the city of Victoria, B.C., from which the above is a portion shown in reduction, necessitated the assembly of some 140 vertical aerial views, which were obtained through the co-operation of the Royal Canadian Air Force at an altitude of 6,000 feet with an aerial camera equipped with a lens of 12-inch focal length, the whole measuring some 50 inches by 70 inches. In the assembly of mosaic maps certain considerations must be kept in mind, including adequate ground control, the bringing of the individual photographs to a common scale, and the printing of the photographs so as to match in tone throughout.

eral drafting, the photographing of maps, plans, sketches, plane-table sheets, aerial mosaics, etc., to any required scale and supplying prints therefrom; making half-tones and line-cuts; pulling proofs of maps in any required combination of colours; and making blue-line litho prints for use of the draughtsmen.

Although the division is primarily engaged on the publication of maps for the Topographical Survey, yet as opportunities present themselves, work is done for other branches of the Government service.

The following is a summary of the more important maps, plans, etc., draughted, photographed and lithographed:—

One-mile sheets of the National Topographic series of Sorel, Calgary Northeast, Shawinigan, Wolfville, and Fredericton. These sheets are in eight colours and show complete topographic information.

Four-mile sheets, also of the National Topographic series, of Sioux Lookout, Armstrong, Kississing, Kenora, Berens River, Lake St. Joseph, Halfway River, and Prophet River. These sheets cover territory of which only very small portions have hitherto been explored and mapped. They show practically all topographical features except contours.

On the three-mile scale, Sectional Map series, two sheets, Dunvegan and Humboldt were published. These also show complete topographical information. Seventeen three-mile sheets of the same series were reprinted and four sheets were reprinted and four sheets were issued on the reduced scale of six miles.

Four index maps, three sheets of the British Columbia-Alberta Boundary, two maps of Canadian national parks, one land classification map, fifty-seven land survey plans and eighteen other plans, mostly for other branches of the department, were also printed.

In the Relief Map room, maps of important urban centres or of areas of special interest are built up in relief. The following statement shows the work done:—

Relief Map	Original Models	Moulds	Casts Made	Casts Covered	Casts Varnished	Casts Framed	Remarks
Niagara River above Falls	1	1	1	1	1	1	
Jasper Park	.....	.....	.....	.....	1	1	Names added.
Edmonton District	.....	.....	1	2	2	2	
Toronto District	.....	.....	2	1	1	1	
Ottawa District	.....	.....	2	2	2	2	
Kamloops	.....	.....	1	2	2	2	
Lake Louise	.....	.....	2	1	1	1	
Sorel	1	1	5	4	4	4	
Montreal District	.....	.....	2	3	3	3	
Banff and Vicinity	.....	.....	2	1	1	1	
Wolfville	1	1	3	2	2	2	
Canada 60-mile	.....	.....	1	.....	1	.....	Fitted this to frame.
Shawinigan	1	1	4	2	2	2	
Quebec District	.....	.....	2	2	2	2	
Brome District	1	1	4	4	4	4	
Regina District	.....	.....	1	1	1	1	
Fredericton	1	1	.....	.....	.....	.....	
Three Rivers	1	1	3	1	1	1	
Kamloops Lake	1	1	3	.....	.....	.....	
Totals	8	8	39	29	31	30	

GEOGRAPHIC BOARD OF CANADA

The Department of the Interior is represented on the Geographic Board of Canada by four members. One of these is the Director General of Surveys, J. D. Craig, who is chairman of the board. Others are F. H. Peters, Surveyor General and Director of the Topographical Survey; O. S. Finnie, Director of the North West Territories and Yukon Branch, and J. E. Chalifour, Chief Geographer of Natural Resources Intelligence Service. During the year Brevet Lt.-Colonel P. de L. D. Passy, Assistant Director, General Staff, replaced Major J. B. Cochrane as representative of the Department of National Defence on the board.

Rulings were given by the board as to names of mountains, lakes, rivers, post offices and railway stations in all parts of the Dominion at the request of the various map-making branches of the federal Government, the Post Office Department, the provincial authorities and the railway companies.

R. Douglas, a member of the staff of the Department of the Interior. is the secretary of the board.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS

The Board of Examiners for Dominion Land Surveyors held two meetings during the year.

The first was a special meeting lasting from Monday, April 30, 1928, to Friday, June 1, 1928 (inclusive), during which examinations were held at Ottawa, Montreal, Quebec, and Calgary.

The second was the regular annual meeting called for by section 9 of the Dominion Lands Surveys Act. It began on Monday, February 11, 1929, and lasted until Thursday, March 14, 1929 (inclusive). During this meeting, examinations were held at Ottawa, Kingston, Saskatoon, Calgary, and Winnipeg.

The total number of candidates who presented themselves at the examinations was 102. Of these, 64 tried the Preliminary Examination; 9 the Final Examination; 28 the Levellers', and 1 tried the Examination for Dominion Topographical Surveyors.

Twenty-four candidates were successful at the Preliminary Examination as follows:—

Anderson, Gordon Stewart, Saskatoon, Sask.
Donald, Robert, Saskatoon, Sask.
Dore, Richard F., Ottawa, Ont.
Douglas, Arnold Howard, Saskatoon, Sask.
Evans, Beverley Abbott, Saskatoon, Sask.
Field, Ralph Channer, Kingston, Ont.
Forsberg, Clarence Rudeford, Saskatoon, Sask.
Gagne, Maurice, Montreal, Que.
Hickman, Thomas Ernest, Kingston, Ont.
Foss, Wallace Lelland, Saskatoon, Sask.
Jones, Llewelyn Edward, Calgary, Alta.
LaCroix, George Wilfrid, Saskatoon, Sask.
Limoges, Jacques, Montreal, Que.
MacDonald, Murray Vickers, Calgary, Alta.
McKnight, Charles Ernest Voyle, Ottawa, Ont.
Medlen, Edward Montague, Ottawa, Ont.
Meikle, James Barton Ross, Winnipeg, Man.
Miller, Charles, Kingston, Ont.
Olsen, Arthur B., Saskatoon, Sask.
Shattuck, Allan Wayne, Saskatoon, Sask.
Stidwill, George Benson, Kingston, Ont.
Taylor, Andrew, Winnipeg, Man.
Viau, Andre, Montreal, P.Q.
Wiebe, Victor, Saskatoon, Sask.

Four candidates were successful at the Final Examination as follows:—

Chaderton, Julian Cuthbert, Ottawa, Ont.
Lilly, Joseph Edwin, Ottawa, Ont.
Ross, Redvers Robert, Ottawa, Ont.
Sinclair, George Edward Blake, Ottawa, Ont.

Fifteen candidates were successful at the Levellers' Examination as follows:—

Bennett, George Francis, Ottawa, Ont.
Christie, John Kenneth, Ottawa, Ont.
Evans, Kenneth Malcolm, Ottawa, Ont.
Furiak, John, Calgary, Alta.
Gorman, Hubert Gregory, Ottawa, Ont.
Harding, Alden Denton, Calgary, Alta.
Haylock, Herbert Rennie, Calgary, Alta.
Jowitt, Sidney, Ottawa, Ont.
Lefebre, Paul, Montreal, P.Q.
Martin, Malcolm T., Montreal, P.Q.
Moule, Harold Godfrey, Ottawa, Ont.
Rabb, Arthur H., Ottawa, Ont.
Thomas, George Henry, Ottawa, Ont.
Thoburn, David Glascott, Ottawa, Ont.
Yong, Mark, Kingston, Ont.

The time of the board during the meetings was largely taken up with the reading and valuation of the candidates' answer papers. Complete sets of question papers to be used at the following examinations were also prepared.

Three commissions were issued to candidates who had passed the final examination and had furnished oaths of office and allegiance and bonds for the sum of one thousand dollars as required by section 25 of the Dominion Lands Surveys Act.

Ten certificates of Preliminary Examination were issued to successful candidates who had complied with the requirements of the law.

Certificates as Levellers were issued to fifteen candidates who had successfully passed the examination.

Six new standard measures of length were issued during the year.

APPENDIX No. 1

SCHEDULE OF SURVEYORS EMPLOYED AND WORK EXECUTED BY THEM

BENNETT, G. A.—

The completion of control surveys and partial completion of plane-table topography of the Moncton two-mile sheet, No. 21-I/S.E., of the National Topographic series, which lies between latitudes 46° 00′ and 46° 30′ and longitudes 64° 00′ and 65° 00′ west of Greenwich; the taking of magnetic observations at different points in the western part of Prince Edward Island and southeastern New Brunswick, and the establishment of magnetic meridians; laying down control surveys for the investigation by the use of aerial photographs of tidal power on the Petitcodiac and Memramcook rivers; the survey of one historic site in New Brunswick.

BLANCHET, G. H.—

Explorations and investigations of an exploratory nature of the region on the west coast of Hudson bay lying in general between Ferguson river and Marble island and extending westerly to Kaminuriak lake.

BRIDGLAND, M.P.—

The completion of plane-table topography of the Calgary S.E. one-mile sheet, No. 82-I/13, of the National Topographic series, which lies between north latitudes 50° 45′ and 51° 00′ and longitudes 113° 30′ and 114° 00′ west of Greenwich, and of the Calgary N.W. one-mile sheet, No. 82-O/1, which lies between north latitudes 51° 00′ and 51° 15′ and longitudes 114° 00′ and 114° 30′ west of Greenwich; the completion of photo-topographical field work of the Revelstoke two-mile sheet, No. 82-L/N.E., which lies between north latitudes 50° 30′ and 51° 00′ and longitudes 118° 00′ and 119° 00′ west of Greenwich; photo-topographical field work in part of Jasper National park, Alberta.

CALDER, J. A.—

Timber berth surveys in township 18 E.C.M. and in township 5-27-6; subdivision of part of township 4-2-7; traverse of islands in Stave river in township 15 E.C.M.; miscellaneous surveys in townships 3-29-6 and 24-19-5; survey of five new Indian reserves and retracement and restoration of boundaries of eleven other reserves in the Lytton Agency.

CARROLL, J.—

Aerial navigator in charge of vertical aerial photographic surveys of portions of the following two-mile sheets of the National Topographic series in Quebec: Buckingham, No. 31-G/N.W., between latitudes 45° 30′ and 46° 00′ and longitudes 75° 00′ and 76° 00′; Lachute, No. 31-G/N.E., between latitudes 45° 30′ and 46° 00′ and longitudes 74° 00′ and 75° 00′; Kempt Lake, No. 31-O/S.E., between latitudes 47° 00′ and 47° 30′ and longitudes 74° 00′ and 75° 00′; Gatineau Forks, No. 31-O/S.W., between latitudes 47° 00′ and 47° 30′ and longitudes 75° 00′ and 76° 00′; Parent, No. 31-O/N.E., between latitudes 47° 30′ and 48° 00′ and longitudes 74° 00′ and 75° 00′; and Abitibi, No. 32-D/N.W., between latitudes 48° 30′ and 49° 00′ and longitudes 79° 00′ and 80° 00′.

CHRISTIE, W.—

Control surveys in Nova Scotia for the production of the two-mile map sheet No. 21-A/S.W., and fractional sheet, No. 21-B/S.E., of the National Topographic series, lying together between latitudes 44° 00′ and 44° 30′ and longitudes 65° 00′ and 67° 00′.

COWPER, G. C.—

Detailed field investigation of the Tramping Lake sheet, No. 217, of the Sectional Map series, in the province of Saskatchewan, comprising townships 33 to 40, ranges 15 to 28, west of the Third meridian, and the restoration of ten per cent of the monuments therein.

DAVIDSON, R. D.—

Aerial navigator in charge of oblique aerial photographic surveys over all or portions of the following four-mile sheets of the National Topographic series: Rainy Lake, No. 52-C, between latitudes 48° 00′ and 49° 00′ and longitudes 92° 00′ and 94° 00′; Dryden, No. 52-F, between latitudes 49° 00′ and 50° 00′ and longitudes 92° 00′ and 94° 00′; Ignace, No. 52-G, between latitudes 49° 00′ and 50° 00′ and longitudes 90° 00′ and 92° 00′; Deer Lake, No. 53-D, between latitudes 52° 00′ and 53° 00′ and longitudes 94° 00′ and 96° 00′; Island Lake, No. 53-E, between latitudes 53° 00′ and 54° 00′ and longitudes 94° 00′ and 96° 00′; Pelican Narrows, No. 63-M, between latitudes 55° 00′ and 56° 00′ and longitudes 102° 00′ and 104° 00′; Lac la Ronge, No. 73-P, between latitudes 55° 00′ and 56° 00′ and longitudes 104° 00′ and 106° 00′; South End, No. 64-D, between latitudes 56° 00′ and 57° 00′ and longitudes 102° 00′ and 104° 00′. Vertical aerial photographic survey of small areas along Churchill river in Manitoba.

DICKSON, H. G.—

The delimitation of about 40 miles of road between Mayo and Dawson in Yukon Territory as a reference line and control survey (performed under contract, Mr. Dickson not being a member of the staff).

DONNELLY, C. B. C.—

Aerial navigator in charge of vertical aerial photographic surveys of portions of four two-mile sheets of the National Topographic series in Nova Scotia and one two-mile sheet in New Brunswick, as follows: Port Mouton, No. 20-P/N.E., between latitudes 43° 30′ and 44° 00′ and longitudes 64° 00′ and 65° 00′; Shelburne, No. 20-P/N.W., between latitudes 43° 30′ and 44° 00′ and longitudes 65° 00′ and 66° 00′; Rossignol, No. 21-A/SW., between latitudes 44° 00′ and 44° 30′ and longitudes 65° 00′ and 66° 00′; St. Mary Bay, No. 21-B/S.E., between latitudes 44° 00′ and 44° 30′ and longitudes 66° 00′ and 67° 00′; and Chipman, No. 21-I/S.W., between latitudes 46° 00′ and 46° 30′ and longitudes 65° 00′ and 66° 00′.

FLETCHER, W. A.—

Control surveys in Quebec for the production of the two-mile map sheet No. 31-K/S.E., of the National Topographic series, between latitudes 46° 00′ and 46° 30′ and longitudes 76° 00′ and 77° 00′.

FRY, E. S.—

Aerial navigator in charge of oblique aerial photographic surveys over all or portions of the following four-mile sheets of the National Topographic series: Rainy Lake, No. 52-C, between latitudes 48° 00′ and 49° 00′ and longitudes 92° 00′ and 94° 00′; Dryden, No. 52-F, between latitudes 49° 00′ and 50° 00′ and longitudes 92° 00′ and 94° 00′; Ignace, No. 52-G, between latitudes 49° 00′ and 50° 00′ and longitudes 90° 00′ and 92° 00′; Deer Lake, No. 53-D, between latitudes 52° 00′ and 53° 00′ and longitudes 94° 00′ and 96° 00′; Island Lake, No. 53-E, between latitudes 53° 00′ and 54° 00′ and longitudes 94° 00′ and 96° 00′; Pelican Narrows, 63-M, between latitudes 55° 00′ and 56° 00′ and longitudes 102° 00′ and 104° 00′; Lac la Ronge, No. 73-P, between latitudes 55° 00′ and 56° 00′ and longitudes 104° 00′ and 106° 00′; South End, No. 64-D, between latitudes 56° 00′ and 57° 00′ and longitudes 102° 00′ and 104° 00′; vertical aerial photographic survey of small areas along Churchill river in Manitoba.

GORMAN, A. O.—

Traverse and investigation of water areas in townships 41-7-4, 44-15-4, 45-15-4, 50-13-3, 47-6-3, 49-22-2, 50-22-2, 41-15-2; survey of right-of-way for drainage ditches in township 44-21-2; retracement surveys in townships 50-26-4, 44-17-3 and 54-13-3; restoration with concrete monuments of 125 section corners in the rural municipality of Woodworth, Manitoba.

HARDOUIN, J.—

Survey of nine blocks comprising 128 summer resort lots on Clear lake, in Riding Mountain Forest reserve; survey of Birch River settlement in township 56-31-Pr., subdivision of part of township 42-25-Pr., Miscellaneous surveys in townships 43-7-2 and 44-3-2, traverses in townships 23-20-Pr., 29-28-Pr., 44-3-2 and 45-3-2.

LAMBART, H. F.—

Triangulation control and photo-topographical surveys along the boundary of Jasper National park, Alberta, and also in the interior of the park.

LEBLANC, P. M. H.—

Control surveys in Quebec for the production of the two-mile map sheet, No. 31-P/S.E., of the National Topographic series, between latitudes 47° 00′ and 47° 30′ and longitudes 72° 00′ and 73° 00′; completion of control surveys for the production of the two-mile map sheets, Nos. 31-I/N.E. and 21-L/N.W., both together lying between latitudes 46° 30′ and 47° 00′ and longitudes 71° 00′ and 73° 00′.

LONERGAN, G. J.—

Land classification surveys in Manitoba adjacent to Sandilands Forest reserve; investigation of red pine production in certain areas east of the Principal meridian; land classification surveys in Saskatchewan adjacent to The Pasquia Triangle, Porcupine Forest reserve, Pasquia Hills reserve, and proposed Three Rivers Forest reserve; completion of first field revision of Fort Assiniboine Sheet, No. 364, of the Sectional Map series, in the province of Alberta.

MCCUSKER, K. F.—

Locating and surveying trails in Wood Buffalo park in Alberta; establishment of southern boundary of timber berth 618 E. near Banff, Alberta; investigation of squatters' improvements on school lands at Drumheller, Alberta; traverse of Whitefox river in townships 51, ranges 18 to 22, west of the Second meridian.

MACDONALD, C. S.—

Observing for latitude and longitude and interpreting oblique aerial photographs in the area east of lac la Ronge, Saskatchewan.

PIERCE, J. W.—

Control surveys in co-operation with the Ontario Department of Surveys for the production of the following two-mile map sheets of the National Topographic series: No. 31-E/N.W., between latitudes 45° 30′ and 46° 00 and longitudes 79°00′ and 80° 00′; No. 31-L/S.W., between latitudes 46° 00′ and 46° 30′ and longitudes 79° 00′ and 80° 00′; and No. 41-H/N.E., between latitudes 45° 30′ and 46° 00′ and longitudes 80° 00′ and 21° 00′.

RINFRET, C.—

Completion of topographic mapping of the Beaupré two-mile sheet, No. 21-M/S.E., of the National Topographic series in the province of Quebec lying between north latitudes 47° 00′ and 47° 30′ and longitudes 70° 00′ and 71° 00′ west of Greenwich; observations for magnetic declination, dip and total force and establishing magnetic meridians at various points; surveying two historic sites in the vicinity of Montreal and obtaining the necessary ground control for the construction of mosaics of Valleyfield, St. Lambert and Longueuil, and Montreal South.

RUSSELL, J.—

Aerial navigator in charge of oblique aerial photographic surveys over a portion of the four-mile Fitzgerald sheet, No. 74-M. of the National Topographic series in Alberta, between latitudes 59° 00′ and 60° 00′ and longitudes 110° 00′ and 112° 00′, and over a small strip lying north therefrom in the Northwest Territories; vertical aerial photographic surveys of Lac Seul storage area in Ontario.

SURETTE, G. A.—

Field interpretation of aerial photographs covering the Shelburne two-mile sheet, No. 20-P/N.W., of the National Topographic series, lying between north latitudes 43° 30′ and 44° 00′ and longitudes 65° 00′ and 66° 00′ west of Greenwich, in the province of Nova Scotia.

TAGGART, C. H.—

Completion of photo-topographical survey of the Merritt two-mile sheet, No. 92-I/S.E., of the National Topographic series, lying between north latitudes 50° 00′ and 50° 30′ and longitudes 120° 00′ and 121° 00′ west of Greenwich; photographic mapping combined with experimental aerial photography over a large portion of the Shuswap two-mile sheet, No. 82-L/N.W., lying between north latitudes 50° 30′ and 51° 00′ and longitudes 119° 00′ and 120° 00′ west of Greenwich; the taking of magnetic observations at different points and establishment of magnetic meridians; erecting forestry monuments in the Merritt and Shuswap Lake districts.

APPENDIX No. 2

LIST OF MAP SHEETS ON WHICH WORK WAS PERFORMED DURING 1928-1929

NATIONAL TOPOGRAPHIC SERIES

(Size of sheet 24 by 30 inches.)

Standard Edition—Topographical information complete.

Provisional Edition—Topographical information complete (except for contours), over all or greater portion of sheet.

Exploratory Edition—Topographical information from exploration surveys, no contours or contours conjectural only.

ONE-MILE SHEETS

Wolfville, No. 21-H/1 (Nova Scotia), latitude 45° 00′ to 45° 15′, longitude 64° 00′ to 64° 30′; contour interval 25 feet, nine colours, standard edition—Issued.

Comeau Hill, No. 20-O/9 (Nova Scotia), latitude 43° 30′ to 43° 45′, longitude 66° 00′ to 66° 30′; contour interval 50 feet, nine colours, standard edition—Issued.

Yarmouth, No. 20-O/16 (Nova Scotia), latitude 43° 45′ to 44° 00′, longitude 66° 00′ to 66° 30′; contour interval 50 feet, nine colours, standard edition—at press.

Fredericton, No. 21-G/15 (New Brunswick), latitude 45° 45′ to 46° 00′, longitude 66° 30′ to 67° 00′; contour interval 25 feet, nine colours, standard edition—Issued.

Shawinigan, No. 31-I/10 (Quebec), latitude 46° 30′ to 46° 45′, longitude 72° 30′ to 73° 00′; contour interval 50 feet, nine colours, standard edition—Issued.

Sorel, No. 31-I/3 (Quebec), latitude 46° 00′ to 46° 15′, longitude 73° 00′ to 73° 30′; contour interval 50 feet, nine colours, standard edition—Issued.

Calgary Southeast, No. 82-I/13 (Alberta), latitude 50° 45′ to 51° 00′, longitude 113° 30′ to 114° 00′; ground surveys made.

Calgary Southwest, No. 82-J/10 (Alberta), latitude 50° 45′ to 51° 00′, longitude 114° 00′ to 114° 30′; drafting in hand.

Calgary Northwest, No. 82-O/1 (Alberta), latitude 51° 00′ to 51° 15′, longitude 114° 00′ to 114° 30′; ground surveys made.

TWO-MILE SHEETS

(Size of sheet 24 by 30 inches.)

Moncton, No. 21-I/S.E. (New Brunswick and Prince Edward Island), latitude 46° 00′ to 46° 30′, longitude 64° 00′ to 65° 00′; control surveys completed; topography commenced.

Shelburne, No. 20-P/N.W. (Nova Scotia), latitude 43° 30′ to 44° 00′, longitude 65° 00′ to 66° 00′; vertical photographs taken of area, field interpretation completed, compilation in hand.

Rossignol, No. 21-A/S.W. (Nova Scotia), latitude 44° 00′ to 44° 30′, longitude 65° 00′ to 66° 00′; vertical photographs taken of area.

St. Mary Bay, No. 21-B/S.E. (Nova Scotia), latitude 44° 00′ to 44° 30′, longitude 66° 00′ to 67° 00′; vertical photographs taken of area.

Beaupré, No. 21-M/S.E. (Quebec), latitude 47° 00′ to 47° 30′, longitude 70° 00′ to 71° 00′, field control, interpretation and contouring completed, compilation in hand.

Grand Mere, No. 31-I/N.E. (Quebec), latitude 46° 30′ to 47° 00′, longitude 72° 00′ to 73° 00′; compilation in hand.

La Tuque, No. 31-I/S.E. (Quebec), latitude 47° 00′ to 47° 30′, longitude 72° 00′ to 73° 00′; compilation in hand.

Lachute, No. 31-G/N.E. (Quebec and Ontario), latitude 45° 30′ to 46° 00′, longitude 74° 00′ to 75° 00′ vertical aerial photographs taken of portion of area.

Kempt Lake, No. 31-O/S.E. (Quebec), latitude 47° 00′ to 47° 30′, longitude 74° 00′ to 75° 00′; vertical aerial photographs taken of area, compilation in hand.

Buckingham, No. 31-G/N.W. (Quebec and Ontario), latitude 45° 30′ to 46° 00′, longitude 75° 00′ to 76° 00′; vertical aerial photographs taken of area, compilation in hand.

PETAWAGA, No. 31-O/S.W. (Quebec), latitude 47° 00′ to 47° 30′, longitude 75° 00′ to 76° 00′; vertical aerial photographs taken of area, compilation in hand.

MUSKOKA, No. 31-E/S.W. (Ontario), latitude 45° 00′ to 45° 30′, longitude 79° 00′ to 80° 00′; drafting in hand.

SUNDRIDGE, No. 31-E/N.W. (Ontario), latitude 45° 30′ to 46° 00′, longitude 79° 00′ to 80° 00′; vertical aerial photographs taken of a portion of area.

ABITIBI, No. 32-D/N.W. (Ontario and Quebec), latitude 48° 30′ to 49° 00′, longitude 79° 00′ to 80° 00′; vertical aerial photographs taken of area, compilation in hand.

PARRY SOUND, No. 41-H/S.E. (Ontario), latitude 45° 00′ to 45° 30′, longitude 80° 00′ to 81° 00′; vertical aerial photographs taken over portion of area.

MAGANATAWAN, No. 41-H/N.E. (Ontario), latitude 45° 30′ to 46° 00′ longitude 80° 00′ to 81° 00′; vertical aerial photographs taken over small portion of area.

HUDSON, No. 52-K/S.E. (Ontario), latitude 50° 00′ to 50° 30′, longitude 92° 00′ to 93° 00′; compilation completed, publication in hand.

ERIKSDALE, No. 62-J/N.E. (Manitoba), latitude 50° 30′ to 51° 00′, longitude 98° 00′ to 99° 00′; vertical aerial photographs taken of part of area.

MCCREARY, No. 62-J/N.W. (Manitoba), latitude 50° 30′ to 51° 00′, longitude 99° 00′ to 100° 00′; vertical aerial photographs taken of area.

CORMORANT LAKE NORTHWEST, No. 63-K/N.W. (Manitoba), latitude 54° 30′ to 55° 00′, longitude 101° 00′ to 102° 00′; vertical aerial photographs taken of part of area.

MISTAYA, No. 82-N/N.E. (Alberta and British Columbia), latitude 51° 30′ to 52° 00′, longitude 116° 00′ to 117° 00′; drafting in hand.

YOHO, No. 82-N/S.W. (British Columbia), latitude 51° 00′ to 51° 30′, longitude 117° 00′ to 118° 00′ compilation in hand.

REVELSTOKE, No. 82-L/N.E. (British Columbia), latitude 50° 30′ to 51° 00′, longitude 118° 00′ to 119° 00′; photo-topographic surveys completed, compilation in hand.

SHUSWAP LAKE, No. 82-L/N.W. (British Columbia), latitude 50° 30′ to 51° 00′, longitude 119° 00′ to 120° 00′; vertical aerial photographs taken of area, interpretation of photographs and contouring over about one fifth, compilation in hand.

ADAMS LAKE, No. 82-M/S.W. (British Columbia), latitude 51° 00′ to 51° 30′, longitude 119° 00′ to 120° 00′; primary control laid down for small portion and vertical aerial photographs of portion in Railway Belt taken.

MERRITT, No. 92-I/S.E. (British Columbia), latitude 50° 00′ to 50° 30′, longitude 120° 00′ to 121° 00′; field work by plane-table and rangefinder completed, drafting in hand.

KAMLOOPS LAKE, No. 92-I/N.E. (British Columbia), latitude 50° 30′ to 51° 00′, longitude 120° 00′ to 121° 00′; contour interval 100 feet; 10 colours, standard edition—Issued.

FRASER LAKE, No. 93-K/S.E. (British Columbia), latitude 54° 00′ to 54° 30′, longitude 124° 00′ to 125° 00′ vertical aerial photographs taken of area.

FOUR-MILE SHEETS

(Size of sheet 24 by 30 inches.)

ARMSTRONG, No. 52-I (Ontario), latitude 50° 00′ to 51° 00′, longitude 88° 00′ to 90° 00′; no contours, 5 colours, provisional edition—Issued.

IGNACE, No. 52-G (Ontario), latitude 49° 00′ to 50° 00′, longitude 90° 00′ to 92° 00′; oblique aerial photographs taken of area.

LAKE ST. JOSEPH, No. 52-O (Ontario), latitude 51° 00′ to 52° 00′, longitude 90° 00′ to 92° 00′; no contours, 5 colours, compilation completed, provisional edition—Issued.

QUETICO, No. 52-B (Ontario), latitude 48° 00′ to 49° 00′, longitude 92° 00′ to 94° 00′; oblique aerial photographs taken of part of area.

RAINY LAKE, No. 52-C (Ontario), latitude 48° 00′ to 49° 00′, longitude 92° 00′ to 94° 00′; oblique aerial photographs taken of part of area.

DRYDEN, No. 52-F (Ontario), latitude 49° 00′ to 50° 00′, longitude 92° 00′ to 94° 00′; oblique aerial photographs taken of area, compilation in hand.

SANDY LAKE, No. 53-F (Ontario and Manitoba), latitude 53° 00′ to 54° 00′, longitude 92° 00′ to 94° 00′; oblique aerial photographs taken of part of area.

RAINY RIVER, No. 52-D (Ontario), latitude 48° 00′ to 49° 00′, longitude 94° 00′ to 96° 00′; oblique aerial photographs taken of part of area.

KENORA, No. 52-E (Manitoba and Ontario), latitude 40° 00′ to 50° 00′, longitude 94° 00′ to 96° 00′; fifty-foot contours in Ontario only, 6 colours, compilation completed, drafting completed; provisional edition—Issued.

DEER LAKE, No. 53-D (Manitoba and Ontario), latitude 52° 00′ to 53° 00′, longitude 94° 00′ to 96° 00′; oblique aerial photographs taken, compilation in hand.

ISLAND LAKE, No. 53-E (Manitoba and Ontario), latitude 53° 00′ to 54° 00′, longitude 94° 00′ to 96° 00′; no contours, 5 colours, oblique aerial photographs taken, compilation completed, drafting completed, provisional edition—Issued.

Oxford House, No. 53-L (Manitoba), latitude 54° 00′ to 55° 00′, longitude 94° 00′ to 96° 00′; compilation completed, drafting completed, publication in hand.

Winnipeg, No. 62-H (Manitoba), latitude 49° 00′ to 59° 00′, longitude 96° 00′ to 98° 00′; drafting in hand.

Selkirk, No. 62-I (Manitoba), latitude 50° 00′ to 51° 00′, longitude 96° 00′ to 98° 00′; compilation in hand.

Hecla, No. 62-P (Manitoba), latitude 51° 00′ to 52° 00′, longitude 96° 00′ to 98° 00′; compilation in hand.

Berens River, No. 63-A (Manitoba), latitude 52° 00′ to 53° 00′, longitude 96° 00′ to 98° 00′; no contours; 5 colours, compilation completed, drafting completed, provisional edition—Issued.

Norway House, No. 63-H (Manitoba), latitude 53° 00′ to 54° 00′, longitude 96° 00′ to 98° 00′; no contours, 5 colours, compilation completed, drafting completed, provisional edition—Issued.

Cross Lake, No. 63-I (Manitoba), latitude 54° 00′ to 55° 00′, longitude 96° 00′ to 98° 00′; compilation in hand.

Waterhen, No. 63-B (Manitoba), latitude 52° 00′ to 53° 00′, longitude 98° 00′ to 100° 00′; compilation in hand.

Kississing, No. 63-N (Manitoba), latitude 55° 00′ to 56° 00′, longitude 100° 00′ to 102° 00′; no contours, 5 colours, compilation completed, drafting completed, provisional edition—Issued.

Amisk, No. 63-L (Saskatchewan), latitude 54° 00′ to 55° 00′, longitude 102° 00′ to 104° 00′; oblique aerial photographs taken of part of area.

Pelican Narrows, No. 63-M (Saskatchewan), latitude 55° 00′ to 56° 00′, longitude 102° 00′ to 104° 00′; oblique aerial photographs taken, compilation in hand.

Reindeer Lake South, No. 64-D (Saskatchewan), latitude 56° 00′ to 57° 00′, longitude 102° 00′ to 104° 00′; oblique aerial photographs taken of part of area, partially compiled.

Prince Albert, No. 73-H (Saskatchewan), latitude 53° 00′ to 54° 00′, longitude 104° 00′ to 106° 00′; compilation in hand.

Lac la Ronge, No. 73-P (Saskatchewan), latitude 55° 00′ to 56° 00′, longitude 104° 00′ to 106° 00′; oblique aerial photographs taken of area, compilation completed, drafting completed, publication in hand.

Chipewyan, No. 74-L (Alberta), latitude 58° 00′ to 59° 00′, longitude 110° 00′ to 112° 00′; compilation in hand.

Fitzgerald, No. 74-M (Alberta), latitude 59° 00′ to 60° 00′, longitude 110° 00′ to 112° 00′; oblique aerial photographs taken of area, compilation in hand.

Lake Claire, No. 84-I (Alberta), latitude 58° 00′ to 59° 00′, longitude 112° 00′ to 114° 00′; compilation in hand.

Peace Point, No. 84-P (Alberta), latitude 59° 00′ to 60° 00′ longitude 112° 00′ to 114° 00′; compilation in hand.

Hay River, No. 84-N (Alberta), latitude 59° 00′ to 60° 00′, longitude 116° 00′ to 118° 00′; compilation in hand.

Alexandra Falls, No. 85-C (Alberta), latitude 60° 00′ to 61° 00′, longitude 116° 00′ to 118° 00′; compilation in hand.

Halfway River, No. 94-B (British Columbia), latitude 56° 00′ to 57° 00′, longitude 122° 00′ to 124° 00′; approximate contours 500 feet, 5 colours, drafting completed, exploratory edition—Issued.

Prophet River, No. 94-G (British Columbia), latitude 57° 00′ to 58° 00′, longitude 122° 00′ to 124° 00′; approximate contours 500 feet, 5 colours, exploratory edition—Issued.

EIGHT-MILE SHEETS

(Size of sheet 24 by 30 inches.)

Hudson Hope, No. 94-S.E. (British Columbia), latitude 56° 00′ to 58° 00′, longitude 120° 00′ to 124° 00′; aproximate contours 500 feet, 5 colours, drafting completed, exploratory edition—Issued.

SECTIONAL MAP SERIES

(Size of sheet 24 by 34 inches.)

New Series Edition.—Detailed topographical information in eight colours, including contours.

Intermediate Series Edition.—Topographical information in five colours, not so complete. Contours when shown, usually approximate only.

Old Series Edition.—General topography only, in from one to four colours.

THREE-MILE SHEETS

BRANDON, No. 72 (Manitoba), latitude 49° 43′ to 50° 25′, longitude 98° 00′ to 100° 05′—Issued. New series reprint.

SWAN RIVER, No. 221 (Manitoba and Saskatchewan), latitude 51° 17′ to 52° 30′, longitude 100° 00′ to 102° 00′—Issued. Old series reprint.

DUCK MOUNTAIN, No. 171 (Manitoba and Saskatchewan), latitude 51° 07′ to 51° 48′, longitude 100° 07′ to 102° 00′—Issued. Old series reprint.

HUMBOLDT, No. 219 (Saskatchewan), latitude 51° 47′ to 52° 30′, longitude 103° 58′ to 106° 01′; drafting in hand.

WILLOWBUNCH, No. 19 (Saskatchewan), latitude 49° 00′ to 49° 42′, longitude 104° 00′ to 106° 00′; drafting in hand. Old series reprint.

PRINCE ALBERT SOUTH, No. 269 (Saskatchewan), latitude 52° 29′ to 53° 12′, longitude 104° 00′ to 106° 00′—Issued. Old series reprint.

WOOD MOUNTAIN, No. 18 (Saskatchewan), latitude 49° 00′ to 49° 42′, longitude 106° 00′ to 108° 02′; drafting in hand.

TRAMPING LAKE, No. 217 (Saskatchewan), latitude 51° 47′ to 52° 30′, longitude 108° 00′ to 110° 00′; compilation in hand.

BATTLEFORD, No. 267 (Saskatchewan), latitude 52° 29′ to 53° 12′, longitude 108° 00′ to 110° 00′; contour interval 50 feet. New series—Issued.

MCMURRAY, No. 516 (Alberta), latitude 55° 59′ to 56° 41′, longitude 109° 59′ to 112° 04′—Issued. Old series reprint.

VERMILION, No. 316 (Alberta) , latitude 53° 00′ to 53° 53′ longitude 110° 00′ to 112° 05′; contour interval 50 feet. New series—Issued.

LETHBRIDGE, No. 15 (Alberta), latitude 49° 00′ to 49° 42′, longitude 112° 00′ to 114° 00′—Issued. New series reprint.

RED DEER, No. 215 (Alberta), latitude 51° 48′ to 52° 29′, longitude 112° 00′ to 114° 00′—Issued. New series reprint.

EDMONTON, No. 315 (Alberta), latitude 53° 00′ to 53° 53′, longitude 112° 00′ to 114° 00′—Issued. New series reprint.

VICTORIA, No. 365 (Alberta), latitude 53° 53′ to 54° 35′, longitude 112° 04′ to 114° 01′; compilation in hand.

ROSEBUD, No. 165 (Alberta), latitude 51° 06′ to 51° 48′, longitude 112° 06′ to 114° 00′—Issued. New series reprint.

PORCUPINE, No. 64 (Alberta and British Columbia), latitude 49° 42′ to 50° 24′, longitude 114° 00′ to 116° 04′—Issued. Old series reprint.

BRAZEAU, No. 264 (Alberta), latitude 52° 29′ to 53° 12′, longitude 114° 00′ to 116° 03′—Issued. Old series reprint.

FORT ASSINIBOINE, No. 364 (Alberta), latitude 53° 53′ to 54° 36′, longitude 114° 00′ to 116° 07′; drafting in hand.

ATHABASKA, No. 213 (Alberta and British Columbia), latitude 51° 47′ to 52° 30′, longitude 115° 58′ to 118° 01′—Issued. Old series reprint.

GIROUX, No. 464 (Alberta), latitude 55° 17′ to 55° 59′, longitude 114° 00′ to 116° 00′—Issued. Old series reprint.

BRULE, No. 313 (Alberta), latitude 53° 00′ to 53° 54′, longitude 116° 00′ to 118° 00′—Issued Old series reprint.

SMOKY RIVER, No. 463 (Alberta), latitude 55° 17′ to 55° 59′, longitude 116° 00′ to 118° 00′—Issued. Old series reprint.

SEYMOUR, No. 162 (British Columbia), latitude 51° 07′ to 51° 46′, longitude 117° 58′ to 120° 06′—Issued. Old series reprint.

DUNVEGAN, No. 462 (Alberta), latitude 55°17′ to 55° 59′, longitude 117° 59′ to 120° 00′—Issued. Intermediate series.

YALE, No. 11 (British Columbia), latitude 49° 00′ to 49° 43′, longitude 120° 00′ to 122° 00′—Issued. Old series reprint.

SIX-MILE SHEETS

(Size of sheet 12 by 17 inches.)

Six-mile reductions of the three-mile sectional sheets are regularly issued immediately after the latter are published. As with the three-mile edition, they are put out in the new series, the intermediate series and the old series forms; the first mentioned, however, on account of the crowding of the information, generally being without contours.

MISCELLANEOUS MAP SHEETS

BRITISH COLUMBIA—Alberta Boundary series: sheets 37, 38, 43, 44—four colours, 15½″ by 19″—Issued.

JASPER PARK—Field work by photo-topographic methods of portion of area.

WATERTON LAKES PARK—Drafting completed.

PRINCE ALBERT PARK—Compilation in hand.

WOOD BUFFALO PARK—Field interpretation of aerial photographs of portion of area; compilation in hand.

OTTAWA-KINGSTON—Drafting in hand.

SOUTHERN SASKATCHEWAN—Showing contours—compilation in hand.

SOUTHERN ALBERTA—Showing contours—four colours; 24″ by 34″—Issued.

INDEX MAP OF MANITOBA AND SASKATCHEWAN—five colours; 21″ by 24″—Issued.

OROGRAPHICAL MAP OF CANADA—Compilation in hand.

REGINA SHEET—Carte Internationale du Monde au Millionieme, N-M 13—eight colours, 24″ by 32″—Issued.

PEACE RIVER BLOCK—Land classification; new edition, 24″ by 34″; drafting in hand.

LOCKHART RIVER BASIN—Exploratory map; new edition, two colours—Issued.

LAKE ATHABASKA—Exploratory map, new edition, two colours—Issued.

FORT SMITH TO RESOLUTION—Exploratory map; new edition, two colours—Issued.

THE PAS MINERAL AREA—Exploratory map; reprint, two colours—Issued.

REINDEER LAKE—Exploratory map; reprint, two colours—Issued.

FOND DU LAC RIVER BASIN—Exploratory map; drafting completed.

INDEX MAP, QUEBEC AND THE MARITIMES—Drafting in hand.